Reproduction of mildews.

HARPER has brought together the results of several years of study of nuclear activities in the mildews in a lengthy and beautifully illustrated publication from the Carnegie Institution.[2] It is impossible for us to consider more than the striking new features of his investigations. The paper contains a résumé of much of his earlier work and a broad discussion of many cytological principles which are of general interest and will richly repay the reader of this very creditable contribution to American botany. The author takes a strong stand for critical morphological analysis and classification of the stages in the life history of thallophytes, with a clear separation of phylogenetic history from physiological functions.

The most important new features of HARPER'S research, chiefly in Phyllactinia, are (1) the establishment of a "central body" within the nucleus, which constitutes a point of attachment for the chromatic elements and gives a clear polarity to the structure, and its continuous existence through the most important phases in the life history; (2) the evidence for the permanence of the chromosomes; and (3) the evidence that the triple mitoses preceded by synapsis in the ascus constitute a double reduction of the chromosomes which are quadrupled by the two nuclear fusions in the life history, the first fusion at the time of the sexual act and the second fusion within the young ascus.

The central body is a permanent structure, always present in the resting nucleus, dividing with each mitosis, and the center for an arrangement of chromatic threads within the nucleus and for the attachment of spindle fibers during nuclear division. Its position determines a pole in the nucleus around which are grouped the chromatic elements, which are thus always in connection with the central body, both in the resting nucleus and during mitosis. This constitutes new evidence for the permanence of the chromosomes throughout the succession of mitoses in the life-history. HARPER has not been able to distinguish the different sets of chromosomes after the nuclear fusions, for the chromatic elements and the central bodies unite very intimately. But the second fusion in the life history, that in the ascus, is followed at once by a period of synapsis and the triple mitoses out of which come the eight chromosomes characteristic of the gametophytic phase of the form.—B. M. DAVIS.

MINOR NOTICES.

Observations in Spitzbergen.—The flora of Spitzbergen is fairly known. Therefore, DR. WULFF, who accompanied the Swedish expedition for the measurement of an arc of the meridian, undertook to make ecological observations on the arctic plants,[3] especially touching their transpiration, occurrence of mycorhiza

[2] HARPER, R. A., Sexual reproduction and the organization of the nucleus in certain mildews. Imp. 8vo. pp. 104. *pls.* 7. Washington: Carnegie Institution of Washington. 1905.

[3] WULFF, THORILD, Observations botaniques faites au Spitzberg. Missions scientifique pour la mesure d'un arc de méridien au Spitzberg. Mission Suédoise. Tome II, X^e^ section, Botanique. Traduit de l'Allemand par H. MARCEL HARDY à Dundee. 4to. pp. 63, *pls.* 4. Stockholm. 1903.